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Remarks/Arguments:

Applicant wishes to thank the Examiner for her detailed comments. As Examiner has grouped her actions by sections, Applicant will respond to these sections one by one.

Response to Amendment

Examiner has stated:

"The amendment filed on 5/2/06 has been entered, per agreement in interview of 7/11/06."

Applicant thanks Examiner for her cooperation.

Claim Rejections - 35 USC § 112

Examiner has stated:

"Claim 8 and are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

"Claim 8 and 18 recites the limitation "first sputter etching away said seed layer of RIE-resistant material before RIE" in lines 3 and 4. Examiner interprets the term "seed layer" to reference a layer which is deposited before the bulk of the layer it is seeding. Examiner fails to understand how a seed layer can be removed prior to the bulk of the material that overlies it. There is insufficient antecedent basis for this limitation in the claim.

"Examiner fails to understand how one could remove the seed layer of the RIE resistant material, prior to RIE, as the limitations in claims 8 and 18, when the limitation of claim 1 and 11 recite that the RIE resistant material is RIE etched through the material as in claim 1 and 11. Is examiner to understand that by removing the seed layer, as in the limitation of claim 8 and 18, there would be anything left of the RIE resistant material to etch through, as in claim 1 or 11? For the sake of examination examiner will interpret the claim limitation to read -- first sputter etch away the seed layer of the RIE resistant material before DRIE. --"

Applicant urges that the Claims 8 and 18 are correct as they stand, and should not be revised to read "first sputter etch away the seed layer of the RIE resistant material before DRIE" as Examiner has proposed. The description on

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pages 8, line 20 through page 9, line 17 explains that the seedlayer of RIE-resistant material is deposited over the surface of the DRIE-resistant material before the photoresist material is deposited and the patterned RIE-resist then formed. Thus, after the RIE-resist primary mask has been deposited between the portions of photoresist, and the photoresist is then removed, portions of the RIE-resist seedlayer will be exposed in the gaps among the patterned RIE-resist material. These exposed seedlayer portions were previously covered by the photoresist, which prevented the deposit of RIE-resist in these areas, and these portions are not now covered with RIE-resist. These will temporarily cover the portions of the DRIE material which are about to be patterned by the RIE. This seedlayer material is somewhat RIE-resistant, and thus, sputter etching may be used to remove it before RIE process begins, as in Claims 8 and 18, or, since the seedlayer is so thin, it may be removed by RIE during the RIE process itself (see page 9, lines 15-17).

Thus Applicant asserts that Claims 8 and 18 are not indefinite as written, and requests that the rejection be withdrawn, and no modification to the wording be made.

Claim Rejections - 35 USC § 103

Examiner has stated:

"Claims 1-4, and 11-14 are rejected under 35 U.S.C. 103(a) as being obvious over Bunch et al. (6,776,690) in view of Lott et al. (4,965,702), Penning (7,027,269) and Gopinath et al. (6,989,331).

"As for claims 1 and 11, Bunch discloses a method for fabricating recording head sliders made from silicon substrates (col. 3, 1.67) using both NiFe and Alumina as DRIE resistant materials, used to DRIE through Al₂O₃ to cut Si wafer into pieces (col. 4, 1.25-28).

"Bunch et al. teaches depositing a layer of Al₂O₃ as the DRIE mask (col.4, 1.3-4). Bunch et al. teaches non-RIE-able material may also be used to define the shape of the material (i.e. on the alumina) (col.4, I. 44-47) used as part of the mask, because it is not etchable in a DRIE process (col.4, 1.35-50).

"Bunch et al. is silent as to etching by RIE through transitional metal to pattern the dielectric layers.

"Lott et al. (4,965,702) teaches use of electrolytically plated metal layers, in form of separate masks or exposed wiring lines, used to mask dielectrics in plasma etching because the etch rate of the dielectric is faster and the metal is substantially unaffected by the plasma (col.4-5, lines 47-15). Although, Lott et al. does not explicitly state the plasma etch of the dielectric is reactive ion etching, Lott does not limit the type of plasma etching.

"Therefore, it would have been obvious to one of ordinary skill in the art at the

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time of invention was made, to select RIE to pattern the dielectric layers through the metal mask, as in applicants' claimed limitation, because Bunch does not limit the type of etching used and RIE is known to be effective for etching dielectric materials, Lott et al. teaches using metal as a mask for dielectrics is beneficial because the dielectric etches faster and the metal is substantially unaffected by the plasma (col.4-5, lines 47-15).

"Bunch et al. does not teach removing the primary mask or secondary masks which will expose the under layer.

"Gopinath et al. (6,989,331) teaches "when the etch for which the hard mask has been formed is completed, it is typically desirable to remove the hard mask" (see col.1, 48-50) which will expose the under layer (see col. 2-3).

"It would have been obvious to one of ordinary skill in the art at the time of invention was made, to remove any hard masked once it has been used, thereby exposing the under layer, as in applicants' limitation of claim 1, because the function of the material has been utilized and Gopinath et al. teaches it is known to be desirable.

"Bunch et al. does not teach silicon substrates for fabricating sliders has a SiO₂ overcoat.

"Penning et al. teaches methods of fabrication for magnetic head, including it is well known that the substrate of the wafer is silicon and on top of the silicon is an oxide, such as SiO₂ (col.4, 1.3-42).

"It would have been obvious to one of ordinary skill in the art at the time of invention was made, to include that the layer on top of the silicon substrate is an oxide, such as SiO₂, as in Penning et al., when fabricating recording head sliders, as Bunch et al., because Penning teaches SiO₂ is preferred because it can be effected by selective etching.

Examiner is reminded that Claims 1 and 11 require that the method of fabrication include "providing a Si wafer which has been fabricated with a SiO₂ overcoat" and "producing a SiO₂ overcoat on said Si wafer" respectively. Applicant can find no reference in either of the cited references to these necessary elements. As pointed out in page 6 of the specification of the present application, SiO₂ overcoat has significant advantages over the use of an alumina overcoat, previously used. One advantage is that the SiO₂ is etchable by RIE processes.

Thus, in the present application, a 2-stage process is used, first with RIE used to cut the SiO₂ (and the layer of DRIE-resist above it), and then second DRIE is used to cut the Si wafer. In order to practice this 2-stage process, it is necessary to use a 2-stage masking process, with a primary mask of RIE-resist and a secondary mask of DRIE-resist. This is why a SiO₂ overcoat is a necessary element of the claims.

Applicant can find no reference to a SiO₂ overcoat in *Bunch* or *Lott*. Without this necessary element, there is no motivation to use a 2-stage process or a 2-stage mask, and therefore no motivation to combine references to produce the

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methods of the present application. Therefore, it cannot be fairly said that the present invention is obvious in view of these references or any combination thereof.

5 In addition, Applicant respectfully points out that none of the cited references teach the use of a primary mask of patterned RIE-resistant material and a secondary mask of alumina. Both *Bunch* and *Lott* teach the use of only a single mask, and nowhere is there a suggestion that both a primary and secondary mask can be used of these materials. As discussed above, this is because they do not
10 teach the use of a Si wafer with SiO₂ overcoat, and therefore a 2-stage mask is not necessary. The cited references do not address the same problems, and thus have no motivation to make such a combination. It is impermissible hindsight to suggest that they do.

15 Thus, it cannot be fairly said that it would be obvious to take separate references, each of which teach only a single mask, and combine them into the method using a two-layered mask structure as claimed in the present application.

Applicant respectfully asserts that independent Claims 1 and 11, as amended, includes the feature of a DRIE-resistant Al₂O₃ mask which has been
20 patterned by the use of a RIE-resistant mask, is not taught nor suggested in *Bunch*, nor any of the cited references, either alone or in combination. Therefore, it cannot be fairly said that the present invention as claimed in Claims 1 and 11 is obvious over *Bunch* in view of *Lott*, or any other cited art.

25 Applicant therefore respectfully requests that the rejection be withdrawn and Claims 1 and 11 be allowed.

Examiner has further stated:

30 "As to claim 2, and 12, see discussion above."
"With respect to claim 3, and 13, see discussion above."
"As to claim 4, and 14, see discussion above."

Applicant respectfully asserts that independent Claims 1 and 11, as amended, includes the feature of a DRIE-resistant Al₂O₃ mask which has been
35 patterned by the use of a RIE-resistant mask, and is not taught nor suggested in *Bunch*, nor any of the cited references, either alone or in combination. Therefore, it

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cannot be fairly said that the present invention as claimed in Claim 1 is obvious over *Bunch* in view of *Lott*, or any other cited art. Likewise, neither reference, nor any combination of cited references, includes the elements of the claimed invention as found in dependent claims 2-4, 6-and 12-14 which all inherit this assertedly novel feature from Claims 1 and 11, and the combination cannot be said to be obvious in view of them.

Applicant therefore respectfully requests that the rejection be withdrawn and Claims 1-4 and 11-14 be allowed.

Claim Rejections - 35 USC § 103

Examiner has stated:

"Claims 6, 7, 9, 16, 17, and 19 are rejected under 35 U.S.C. 103(a) as being obvious over *Bunch et al.*, *Lott et al.*, *Penning et al.*, and *Gopinath et al.*, as applied to claims 1-4 above, in view of *Bonin et al.* (6,459,260).

"*Bunch et al.* teaches...

"As to claims 6, 7, 16, and 17, *Bonin et al.* teaches ...

"*Bonin et al.* teaches metal plated material (i.e. primary mask) may be removed (i.e. selectively) by wet etching, as in claims 9 and 19 (see col. 7, l. 50-53).

Applicant respectfully asserts that independent Claims 1 and 11, as amended, includes the feature of a DRIE-resistant Al_2O_3 mask which has been patterned by the use of a RIE-resistant mask is not taught nor suggested in *Bunch*, nor any of the cited references, either alone or in combination. Therefore, it cannot be fairly said that the present invention as claimed in Claim 1 is obvious over *Bunch* in view of *Lott*, or any other cited art. Likewise, neither reference, nor any combination of cited references, includes the elements of the claimed invention as found in dependent Claims 6, 7, 9, 16, 17, and 19 which all inherit this assertedly novel feature from Claims 1 and 11, and the combination cannot be said to be obvious in view of them.

Applicant therefore respectfully requests that the rejection be withdrawn and Claims 6, 7, 9, 16, 17, and 19 be allowed.

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Claim Rejections - 35 USC § 103

Examiner has stated:

5 "Claims 8 and 18 are rejected under 35 U.S.C. 103(a) as being obvious over Bunch et al., Lott et al., Penning et al., Gopinath et al., and Bonin et al (6,459,260) in view of Shue et al. (6,686,280).

"The combined teaching of Bunch et al. fails to teach the metal layer is removed prior to DRIE, as in claims 8 and 18 (see discussion toward claim 8, above).

10 "Shue et al. teaches it is known and conventional to sputter etch away a seed layer (see abstract).

"It would have been obvious to one of ordinary skill in the art at the time of invention was made, to modify the invention of for fabricating recording head sliders, as Bunch, by including a step to sputter etch away a seed layer, as Shue et al. because Shue et al. teaches removing the seed layer provides the benefit of removing unwanted materials which lie over the seed layer."

20 Applicant respectfully asserts that independent Claims 1 and 11, as amended, includes the feature of a DRIE-resistant Al_2O_3 mask which has been patterned by the use of a RIE-resistant mask is not taught nor suggested in *Bunch*, nor any of the cited references, either alone or in combination. Therefore, it cannot be fairly said that the present invention as claimed in Claim 1 is obvious over *Bunch* in view of *Lott*, or any other cited art. Likewise, neither reference, nor any combination of cited references, includes the elements of the claimed invention as found in dependent claims 8 and 18 which all inherit this assertedly novel feature from Claims 1 and 11, and the combination cannot be said to be obvious in view of them.

25 Applicant therefore respectfully requests that the rejection be withdrawn and Claims 8 and 18 be allowed.

Claim Rejections - 35 USC § 103

Examiner has stated:

35 "Claims 10 and 20 are rejected under 35 U.S.C. 103(a) as being obvious over Bunch et al., Lott et al., Penning et al., Gopinath et al., in view of JP 60254731 A.

"The modified invention of Bunch et al. fails to teach the limitations of claims 10 and 20.

"JP 60254731 A teaches it is known and conventional to remove alumina by selective wet etching (see title).

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5 "It would have been obvious to one of ordinary skill in the art at the time of invention was made, to modify the invention of for fabricating recording head sliders, as Bunch, by including a step of removing alumina by selective wet etching, as JP 60254731 A, because JP 60254731 A teaches wet etching will perfectly eliminates the alumina resulting with a structure that is desired."

10 Applicant respectfully asserts that independent Claims 1 and 11, as amended, includes the feature of a DRIE-resistant Al_2O_3 mask which has been patterned by the use of a RIE-resistant mask is not taught nor suggested in *Bunch*, nor any of the cited references, either alone or in combination. Therefore, it cannot be fairly said that the present invention as claimed in Claim 1 is obvious over *Bunch* in view of *Lott*, or any other cited art. Likewise, neither reference, nor any combination of cited references, includes the elements of the claimed invention as found in dependent Claims 10 and 20 which all inherit this assertedly novel feature from Claims 1 and 11, and the combination cannot be said to be obvious in view of them.

15 Applicant therefore respectfully requests that the rejection be withdrawn and Claims 10 and 20 be allowed.

20 Therefore, Applicant respectfully requests that all rejections as to existing Claims 1-4, 6-14 and 16-20 be withdrawn and these claims be allowed.

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Conclusion:

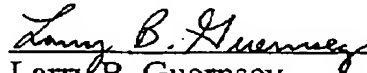
Applicant has endeavored to put this case into complete condition for allowance. It is thought that the §112 rejection was based on a misunderstanding of material presented in the specification, and that the §103 rejections were unfounded on the references cited. Applicant therefore respectfully asks that the rejections be withdrawn and that allowance of all claims presently in the case now be granted.

If the Examiner would like to discuss any of the points involved in the Response, she is urged to contact Applicant's Attorney at the numbers included below.

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